Amendments to the Claims

This Listing of Claims replaces all prior versions, and listings, of claims in this application.

1- 35 (Cancelled).

36. (New) An electrophoresis apparatus, comprising:

a transport passage having a sample inlet end and an outlet end;

a first separation passage in fluid communication with and intersecting the transport passage at a first intersection and crossing over the transport passage;

the first separation passage having a buffer solution inlet end;

first affinity means for attracting and concentrating in the first intersection a first analyte of interest from a sample introduced into the transport passage and allowing the concentrated first analyte of interest to be subsequently conveyed by at least electrophoresis migration via the first separation passage to a detector system which identifies and characterizes analytes of interest;

a second separation passage in fluid communication with and intersecting the transport passage at a second intersection which is downstream of the first intersection and crossing over the transport passage;

the second separation passage having a buffer solution inlet end; and

second affinity means for attracting and concentrating in the second intersection a second analyte of interest from the introduced sample and allowing the concentrated second analyte of interest to be subsequently conveyed by at least electrophoresis migration via the second separation passage to the detector system.

37. (New) The electrophoresis apparatus of claim 36 further comprising: a third separation passage in fluid communication with and intersecting the transport passage at a third intersection which is downstream of the second intersection and crossing over the transport passage; the third separation passage having a buffer solution inlet end; and third affinity means for attracting and concentrating in the third intersection a third analyte of interest from the introduced sample and allowing the third analyte of interest

to be subsequently conveyed by at least electrophoresis migration via the third separation passage to the detector system.

38. (New) The electrophoresis apparatus of claim 37 wherein the first, second and third affinity means allow the concentrated first, second and third analytes of interest to be sequentially conveyed to the detector system.

39. (New) The electrophoresis apparatus of claim 37 wherein the transport passage has an inner diameter larger than the inner diameters of each of the first, second and third separation passages.

40. (New) The electrophoresis apparatus of claim 36 wherein the first affinity means includes a first matrix assembly and the second affinity means includes a second matrix assembly.

41. (New) The electrophoresis apparatus of claim 36 wherein the first and second intersections are both cruciform-shaped intersections.

42. (New) The electrophoresis apparatus of claim 36 further comprising a buffer solution container in fluid communication with the buffer solution inlet end of the first separation passage.

43. (New) The electrophoresis apparatus of claim 36 wherein the buffer solution end of the first separation passage is connected to a container containing a background electrolyte, a high-viscosity solution, or an elution buffer.

44. (New) The electrophoresis apparatus of claim 36 wherein the first separation passage allows a sample or separation buffer to be introduced thereinto by pressure, vacuum or electrokinetic flow.

45. (New) The electrophoresis apparatus of claim 36 wherein the first affinity means includes first-analyte binding microstructures.

46. (New) The electrophoresis apparatus of claim 45 wherein the first affinity means includes frits for holding the microstructures.

47. (New) The electrophoresis apparatus of claim 45 wherein the microstructures are fritless microstructures.

48. (New) The electrophoresis apparatus of claim 45 wherein the transport passage and the first separation passage include restricted diameters for retaining the microstructures.

49. (New) The electrophoresis apparatus of claim 36 wherein the first affinity means allows the concentrated first analyte of interest to be released from the first intersection by hydrodynamically-conveyed separation buffer introduced into the buffer solution inlet end of the first separation passage.

50. (New) The electrophoresis apparatus of claim 36 wherein the first affinity means allows the concentrated first analyte of interest to be released from the first intersection by electrokinetically-conveyed separation buffer introduced into the buffer solution inlet end of the first separation passage.

51. (New) The electrophoresis apparatus of claim 36 wherein the first analyte of interest is adapted to be released from the first affinity means and further separated in the first separation passage by at least one of electrokinetic driven flow or hydrodynamic driven flow, or both driven flows.

52. (New) The electrophoresis apparatus of claim 36 wherein the detector system includes a UV detector.

53. (New) The electrophoresis apparatus of claim 36 wherein the detector system includes a fluorescence detector.

54. (New) The electrophoresis apparatus of claim 36 wherein the detector system is an electrochemical detector.

55. (New) The electrophoresis apparatus of claim 36 wherein the detector system is a mass spectrometer detector.

56. (New) The electrophoresis apparatus of claim 36 wherein the detector system is a circular dichroism detector.

57. (New) The electrophoresis apparatus of claim 36 wherein the detector system is a nuclear magnetic resonance detector.

58. (New) The electrophoresis apparatus of claim 36 further comprising an analyte concentrator in the first separation passage and downstream of the first affinity means.

59. (New) The electrophoresis apparatus of claim 58 wherein the analyte concentrator includes microstructures coated with a chromophoric agent to enhance ultraviolet absorptivity, fluorescence, phosphorescence, chemiluminescence or bioluminescence of the first analyte of interest passing therethrough.

60. (New) The electrophoresis apparatus of claim 59 wherein the analyte concentrator is fritless or the microstructures are made of polymeric materials or are chemically interconnected to each other and to an inner wall of the first separation passage.

61. (New) The electrophoresis apparatus of claim 59 wherein the analyte concentrator includes frits in the first separation passage for retaining the microstructures.

62. (New) The electrophoresis apparatus of claim 36 further comprising an exit outlet passage into which the first and second separation passages flow, and the detector system being positioned operatively at the outlet passage.

63. (New) The electrophoresis apparatus of claim 62 wherein each of the passages is a capillary.

64. (New) The electrophoresis apparatus of claim 62 wherein each of the passages is a channel.

65. (New) The electrophoresis apparatus of claim 62 further comprising: a third separation passage in fluid communication with and intersecting the transport passage at a third intersection which is downstream of the second intersection and crossing over the transport passage; the third separation passage having a buffer solution inlet end; third affinity means for attracting and concentrating in the third intersection a third analyte of interest from the introduced sample and allowing the third analyte of interest to be subsequently conveyed by at least electrophoresis migration via the third separation passage to the detector system; and the third separation passage flowing into the outlet passage.

66. (New) The electrophoresis apparatus of claim 65 wherein the first, second and third affinity means allow the concentrated first, second and third analytes of interest to be sequentially conveyed in the outlet passage to the detector system.

67. (New) The electrophoresis apparatus of claim 62 wherein the exit outlet passage is connected to a container having a grounding electrode.

68. (New) The electrophoresis apparatus of claim 36 wherein an outlet end of the first separation passage and an outlet end of the second separation passage are connected to a container having a grounding electrode.

69. (New) The electrophoresis apparatus of claim 68 wherein the first and second separation passages are connected proximate to the container to an on-line common detector.

70. (New) The electrophoresis apparatus of claim 36 wherein the first affinity means includes microstructures carrying at least one affinity element adapted to attract the first analyte of interest.

71. (New) The electrophoresis apparatus of claim 70 wherein the second affinity means includes microstructures carrying at least one affinity element adapted to attract the second analyte of interest.

72. (New) The electrophoresis apparatus of claim 36 wherein the first and second separation passages are both perpendicular to the transport passage.

73. (New) The electrophoresis apparatus of claim 36 wherein each of the passages is a capillary.

74. (New) The electrophoresis apparatus of claim 36 wherein each of the passages is a channel.

75. (New) The electrophoresis apparatus of claim 36 wherein the transport passage and the first and second separation passages are all formed into a microchip.

76. (New) The electrophoresis apparatus of claim 36 further comprising a waste container into which excess amounts of sample in the transport passage pass out through the outlet end.

77. (New) The electrophoresis apparatus of claim 76 wherein the transport passage has an inlet end in through which a washing buffer can be introduced for washing excess sample and unwanted materials out to the waste container.